

**11/07/02**

**Last Lecture**

- MNCs make decisions on DFI projects on the basis of NPVs.
- MNCs use discount rates to establish NPV for projects
  - the higher the discount rate, the lower the chances of a project to have a  $NPV > 0$ .

Q: Where do discount rates come from?

A: For projects abroad, a key element is Country risk (CR)

**This Lecture**

In this class, we will study country risk and how it impacts projects.

## **Chapter 16 - Country Risk (CR)**

### **Country Risk: Introduction**

CR reflects the (potentially) negative impact of a country's economic and political situation on an MNC's, a lender's or an investor's CFs.

#### **Country Risk**

Definition: Country risk (CR) is the risk attached to a borrower or an investment by virtue of its location in a particular country.

Note: CR is different than FX risk. CR risk can be zero and FX can be huge for a given country. The reverse, though unusual, can also happen.

#### **• Q: What are the determinants of CR?**

We look for variables that have a negative effect (reduce and/or disrupt) on the CFs of a lender/investor. We consider variables that have the potential to produce expropriations, change in regulations/taxes, exchange rate/banking crisis, revolutions, wars, etc. A good economy, sound institutions (independent branches of government) tend to be good indicators for CR.

In general, we tend to put the determinants of CR in groups. For example:

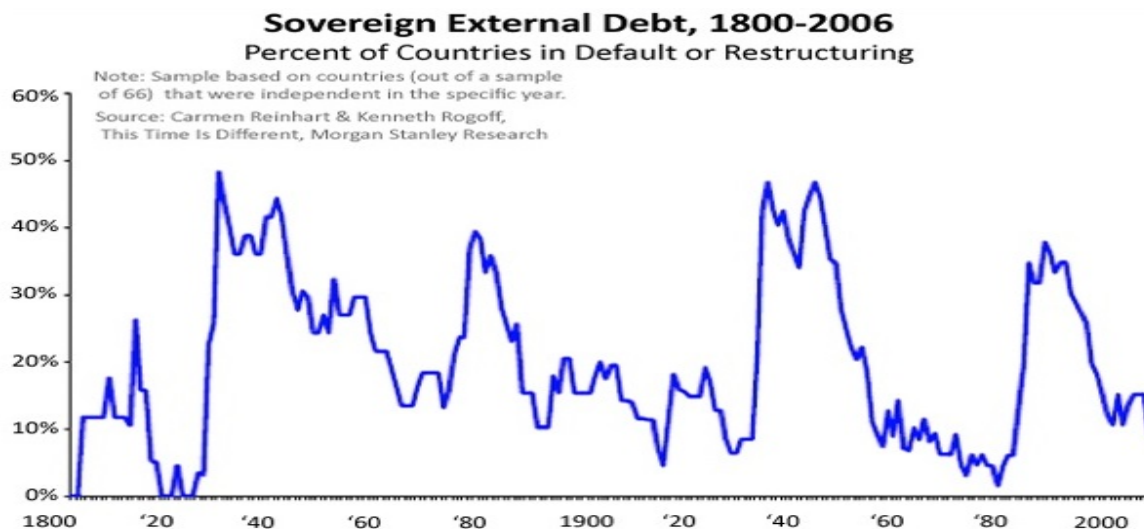
- Economic variables, such as GDP growth, government deficit, debt, trade balance,  $S_t$ , etc.
- Political variables, such as orientation of government, potential for change in regulations/policies, etc.
- Legal variables, such as quality of court system, protections of investors/creditors, etc.
- Social variables that can contribute to the stability of a country, such as poverty, corruption, etc.

Global factors also matter. For example, if the world economy is doing well it is likely that the economy of a particular country is doing well, reducing country risk.

• **Q: Why does country risk analysis matter?**

A: Look at the 2014 Ukraine crisis and the 2011 Greek crisis. Look at the Argentine debt default on Dec. 2001. Value of Russian, Ukrainian, Greek and Argentine assets went down significantly after those crises. Banks, MNCs, bondholders, and investors realize the relevance of country risk analysis.

Sovereign debt crises are not rare. See graph below from Reinhart and Rogoff (2011), which does not even include the debt defaults/restructures of Ecuador (2008), Iceland (2008) and Greece (2011).



• **Credit and Interest Rate Risk for Bonds: Brief Review**

Bonds are subject to two types of risk:

- 1) *Interest rate risk*: The risk associated to changes in interest rates.
- 2) *Credit/default risk*: The risk associated to the probability of default combined with the probability of not receiving principal and interest in arrears after default.

Credit rating agencies describe (measure) the credit risk with a credit rating (a letter grade). The credit rating is usually estimated using financial characteristics of firms, such as the interest coverage ratio and the leverage ratio.

Note: It is not entirely clear what a credit rating means. Some economists (myself included) say it is a measure of the probability of default over a specified horizon. Other economists say it is a measure of expected loss.

Rule: Regardless of the interpretation of a rating, the higher the grade, the lower the yield (YTM) of the bond. For any company, the **YTM** is set by a spread, reflecting credit risk, over base rate, usually, over the *risk-free rate* (typically, the yield of government bonds):

$$\text{YTM} = \text{Base rate} + \text{Credit Risk Spread}$$

Note: For us, the risk-free rate of a country is set by the YTM of government bonds.

Risk-free rate for country J = **YTM of government bonds of Country J**.

## Construction of a Country Risk Grade (Score)

CR is associated with credit (default) risk, which is influenced by political risk and economic risk.

### • Measuring CR

CR is, in general, reported as a grade: A very good, C bad.

Same credit rating rule applies: The higher the grade for a country, the lower the discount rate used to evaluate projects in that country.

We will associate CR with a spread over a risk-free rate (in the U.S. or USD debt segment: US Treasuries). That is, CR influences the interest on the debt issued by a government of a country. Many times the spread is called *sovereign default spread* or, just, country risk (CR).

**Example:** Setting yields for Mexico (actually, the Mexican government)

The Mexican government wants to borrow in USD for 3 years. Since the debt is in USD, the Base rate is the 3-year US Treasuries rate.

The YTM for Mexican government debt  $\text{YTM}_{\text{Mex}}$  (in USD) is set by

$$\text{YTM}_{\text{Mex}} = \text{US Treasuries} + \text{Spread (risk premium, a function of CR)}$$

Data:

Mexico's grade: BBB (associated with a spread of 140 bps (1.40%) over US Treasuries).

3-yr US Treasuries yield = **3%**.

$$\Rightarrow \text{YTM}_{\text{Mex}} (\text{USD}) = \text{3\%} + 1.40\% = 4.40\% \quad (\text{sovereign default spread: 1.40\%})$$

If the Mexican government wants to borrow in MXN, we have to introduce the expected change in  $S_t$  (measured as an annualized  $e_{f,t}$ ). Using linearized IFE (with MXN as the DC):

$$\text{Yield}_{\text{Mex}} (\text{MXN}) \approx \text{YTM}_{\text{Mex}} (\text{USD}) + E[e_{f,t}]. \quad \P$$

• There are two approaches to measure CR (and get a grade):

- (1) Qualitative – collect data, get an opinion from “experts,” form a “consensus” grade
- (2) Quantitative – collect data, process the data with a computer model, get a grade

(1) Qualitative Approach: Talk to experts (politicians, union members, economists, etc) to form a consensus opinion about the risk of a country. The consensus opinion becomes the grade. This process is “subjective.”

(2) Quantitative Approach: Start with some quantifiable factors that affect CR. Use a formula to determine numerical scores for each factor. Calculate a weighted average of the factors' numerical scores. This weighted average determines the final grade. This process is (or seems more)

“objective.”

We will emphasize the Quantitative Approach.

### **Quantitative Approach – Getting a CR Grade (Score):** Risk Rating Method (Check list)

The Check list approach provides a weighted average of grades for four major aspects of a country:

- i. Economic Indicators (EI) (financial condition)
- ii. Debt management (DM) (ability to repay debt)
- iii. Political factors (PF) (political stability)
- iv. Structural factors (SF) (socioeconomic conditions, legal structure)

The scores (between 0 and 100) for each factor are a function of “fundamental data.” For example, the economic indicator’s grade depends on GDP per capita, GDP growth, inflation, interest rates, etc. Debt management’s grade depends on growth of money, trade balance, foreign and domestic debt, fiscal balance, etc.

A formula is used to compute the scores for each factor and the final score is computed as a weighted average of the four scores. For example, for Country J:

$$\text{Score(EI)} = \alpha_0 + \alpha_1 \text{ GDP growth} + \alpha_2 \text{ Inflation} + \alpha_3 \text{ Productivity} + \dots$$

$$\Rightarrow \text{Final Score} = \omega_{EI} \text{ Score(EI)} + \omega_{DM} \text{ Score(DM)} + \omega_{PF} \text{ Score(PF)} + \omega_{SF} \text{ Score(SF)}$$

Note: The weights should be positive ( $\omega_j \geq 0$ ) and should up to 1 :

$$\sum_j \omega_j = 1, \quad \text{—i.e., } \omega_{EI} + \omega_{DM} + \omega_{PF} + \omega_{SF} = 1.$$

Once a final score is determined a Table, like Table 16.1 is used to translate the final score into a rating, given by a letter grade. For example if Final Score of Country J is 83, we will give it a AA rating.

• Q: Where are the weights and the formulae for the grades coming from?

This method seems more “objective,” because it is based on hard economic data, but weights and formulas might be “subjective.” It is more an art, than an exact science.

Regressions and experience can be used to determine the factors and their coefficients ( $\alpha_0, \alpha_1, \alpha_2, \dots$ ).

The signs of the coefficients have to “make sense” —i.e., go according to economic theory. For example, we expect GDP growth & inflation to have  $\alpha_1 > 0$  and  $\alpha_2 < 0$ .

• The model can deliver different forecasts: Short-term, Medium-term, and Long-term. The weights and grades can change depending on your horizon.

For example:

- (a) Short-term: More weight to debt management and political factors.
- (b) Long-term: More weight to economic indicators and structural factor.

- Each model assigns a score between 0 and 100.

Each grade is associated with a spread in basis points (bps) over base rate, usually the risk free rate. The following Table presents the standard conversion table. (Suppose for 1-year maturities.)

**TABLE 16.1**  
**Conversion Table of a Country's Grade into a Rating and Spreads over US Treasuries**

<u>Overall grade</u>	<u>Rating</u>	<u>Interpretation</u>	<u>Spread (in bps)</u>	<u>Average</u>
91-100	AAA	Excellent	5-40	20
81-90	AA		35-70	50
<b>71-80</b>	<b>A</b>		<b>60-100</b>	<b>80</b>
61-70	BBB	Average risk	100-160	130
51-60	BB		160-350	240
41-50	B		340-570	440
31-40	CCC	Excessive risk	560-680	650
21-30	CC		650-900	770
10-20	C		900+	1000
0-10	D	In Default	(debt in arrears)	

Notes:

- ◊ A rating of BBB or better is considered “*investment grade*.”
- ◊ A rating of BB or less is considered “*junk*” (also called “*high-yield*,” “*speculative grade*”). In the U.S., the usual spread of junk debt is between 400 to 600 bps over 1-yr T-bills. Range is very wide: Spreads can go over 2600 bps.
- ◊ This Table is for short-maturities. As time to maturity increases, the spread (in bps) also increases.
- ◊ Spreads are not constant over time, global and credit market conditions matter. We pointed out above that global factors matter. If developed markets are doing well, in general we tend to see that liquidity and appetite for risk in credit markets increases. These two factors will drive down spreads.
- ◊ This Table gives spreads over T-bills, in USD. If we are interested in converting the YTM in USD into a YTM in the local currency, we use IFE combined with relative PPP to estimate  $E[er]$ . That is, using the linearized version of both formulas, we get:

$$YTM_D(\text{in local currency}) \approx YTM_D(\text{in USD}) + (I_D - I_{US}).$$

**Example:** Suppose country DX wants to borrow short-term & medium-term in USD. Bertoni Bank evaluates the country risk of country DX.

Factor	Short-term Horizon			Medium-term Horizon		
	Weight	Grade		Weight	Grade	
Economic	.3	80	24	.3	70	21
Debt management	.3	90	27	.2	70	14
Political	.3	67	12	.2	50	15
Structural	.1	75	<u>15</u>	.3	60	<u>12</u>
Total			<b>78.6</b>			<b>63</b>
Short-term ranking: A						
Medium-term ranking: BBB						

That is, the short-term debt of country DX will get a spread in the **60-100 bps** range, say **77 bps** over US Treasuries; while the medium-term debt will get a higher spread, say 108 bps.

Suppose the short-term US Treasuries yield 3% (s.a.). Then, the short-term debt of country DX yields  

$$\text{YTM}_{\text{DX}}(\text{in USD}) = 3\% \text{ (s.a.)} + 0.77\% \text{ (s.a.)} = 3.77\% \text{ (s.a.)}.$$

To translate the USD yield to local currency, we use linearized IFE and linearized PPP to set  $E[e_{f,t}]$ . That is,

$$\text{YTM}_{\text{DX}}(\text{in DX currency}) \approx \text{YTM}_{\text{DX}}(\text{USD}) + E[e_{f,t}] = \text{YTM}_{\text{DX}}(\text{USD}) + E[I_{d=\text{DX}} - I_{f=\text{US}}].$$

Based on the past 10 years, the expected inflation in country DX is 5% and in the U.S. is 2%, then  

$$\text{YTM}_{\text{DX}}(\text{in DX currency}) = 3.77\% + 3\% = 6.77\% .\P$$

**Remark:** The observed spread, the sovereign default spread, –i.e., the difference between the US Treasuries yield and another government debt yield (in USD)– is a good proxy for CR. The CDS (Credit Default Swap) market allows investors to buy insurance against CR. The insurance premium paid (say, 1.60% per year) is also a good indicator for CR! (Both indicators should be similar!)

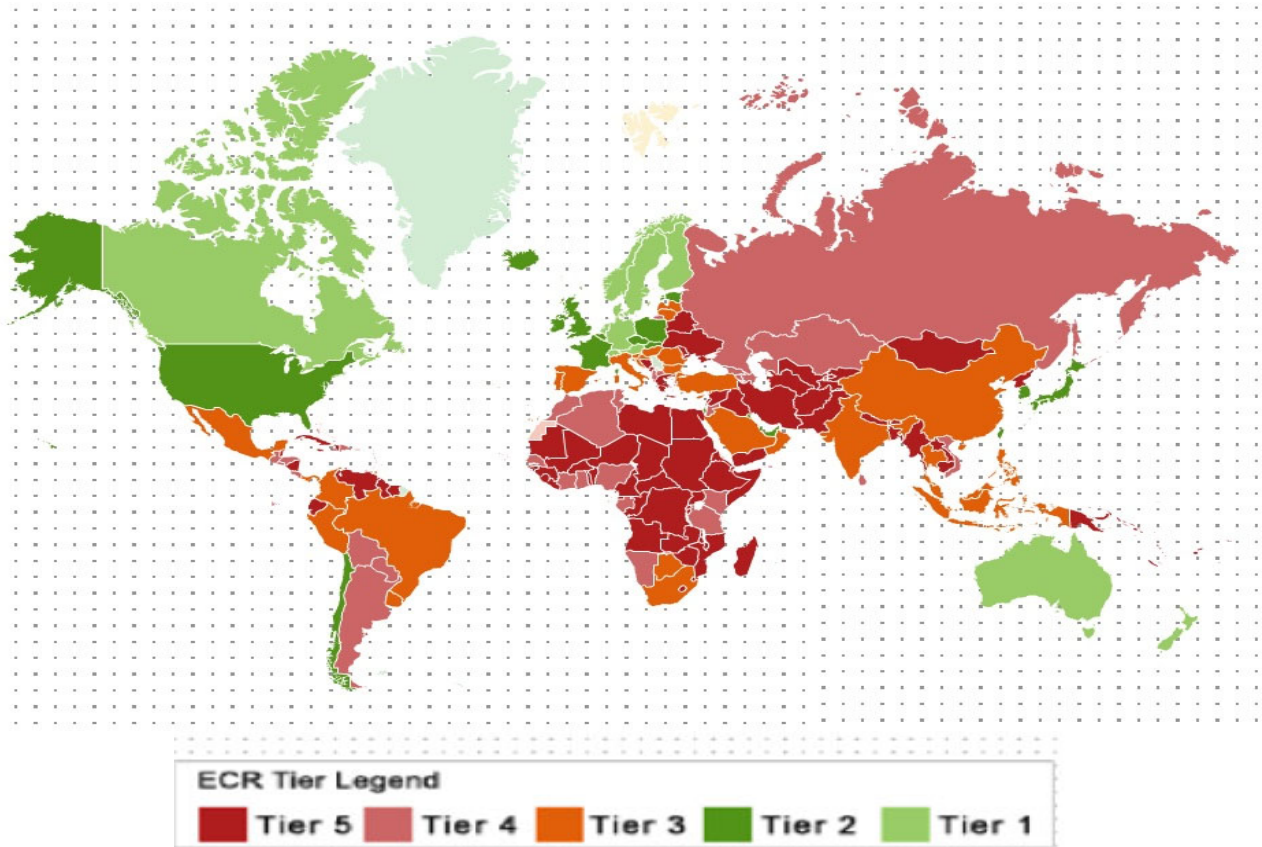
**Example:** Weights and Factors in Practice (*Euromoney*) – February 2018

The British magazine *Euromoney* produces semi-annual country risk analysis of 189 countries using a panel of more than 400 experts. *Euromoney* rates six categories with a score (0 to 100).

Categories and weights:

Economic performance	- 30% weight
Political Risk	- 30% weight
Structural assessment	-10% weight
Debt indicators: Debt/GDP; Debt service/X; & X-M/GDP	-10% weight
Credit rating: Moody's or S&P's or Fitch IBCA's rating	-10% weight
Access to bank finance/Capital markets: Experts grade from 0 to 10.	- 10% weight

Based on the weighted average for each country, each country is placed on a Tier (Tier 1=AAA, Tier 5=C). A world country risk weighted average is also calculated: 42.77 (B rating or Tier 4)



#### • Measures to reduce CR

- ◊ A cap on the total amount invested in a particular country
- ◊ Diversification
- ◊ Credit Risk Derivatives

#### **Diversification and Country Risk**

Taken From “**Profits in a Time of War**,” The Economist, Sep 20, 2014.

An excessive concentration on one country is a classic mistake. After China’s revolution in 1949 HSBC, then a purely Asian bank, lost half its business. Iran’s nationalisation in 1951 of the Anglo-Iranian Oil Company’s assets devastated the firm, a precursor of BP.

There are modern echoes of these episodes. Repsol, a Spanish oil firm, fell in love with Argentina, leaving it vulnerable when YPF, the firm it bought there, was nationalised in 2012. First Quantum, of Canada, had made a third of its profits from a mine that the Democratic Republic of Congo nationalised in 2009. But as they have expanded over the past two decades, multinationals have spread themselves more. Only a dozen big, global, listed firms have over a tenth of their sales in Russia. BP is the country’s largest foreign investor but gets only about 10% of its value from its



stake in Rosneft, an oil giant. McDonald's Moscow outlets, once a symbol of détente, are temporarily shut, victims of a diplomatic tit-for-tat. Even so, the burger giant makes less than 5% of its profits in Russia.

This picture is true in other hotspots. Telefonica, a Spanish firm, and Procter & Gamble (P&G), together have billions of dollars trapped in Venezuela, which has introduced capital controls. But it represents less than 5% of their sales. Ben van Beurden, the boss of Royal Dutch Shell, recently said diversification is “the only way to inoculate yourself”.

### • Review of CR

- ◊ Pros
  - It is simple (many factors simplify to a letter)
  - It allows cross-country and across time comparison.
- ◊ Cons
  - It is too simple.
  - In practice, ratings tend to converge (*herding*).
  - Not a lot of predictive power.

The last point –i.e., the lack of predictive power– is a major criticism. For example, a month before the 1997 Asia crisis, South Korea was rated as Italy and Sweden. Then, Fitch went from rating Korea as AA- (investment grade) to B- (junk) in one month. Other rating agencies replicated the same dramatic sudden change in Korea's CR rating.

Similar sudden downgrades occurred during the 2009-2012 European debt crisis with Greece, Cyprus, Ireland, Italy, Portugal, and Spain.

Given the lack of predictive power of CR, a single indicator may not be enough to capture the overall risk of a country. There are other indexes that may help to signal the *true* riskiness of a country – i.e., indicators that can be correlated with the underlying true country risk. For example, *FDI confidence index* (produced by A.T. Kearny), *Global competitiveness index (GCI)* (produced by World Economic Forum), *Index of economic freedom* (produced by the Heritage Foundation and the Wall Street Journal), *Opacity index* (produced by PWC and The Milken Institute), etc.

### Examples of CR Ratings:

1) From A.M. Best, December 2018 (<http://www.ambest.com/ratings/countryrisk.asp>):

A.M. Best uses country risk analysis to determine how the factors outside an insurer's control affect its ability to meet its obligations to its policyholders. These analyses include, amongst others, the assessment of local accounting rules, government policies and regulation, economic growth and social stability. A.M. Best has a five-tier scale and assigns a Country Risk Tier I-V based on each country's level of risk (I-lowest risk, V-highest risk).

Australia, Austria, Canada, Japan, Luxembourg, Singapore, Sweden, Switzerland, UK, USA	Tier I
Bermuda, Cayman Islands, Chile, HK, Italy, Ireland, New Zealand, Spain, South Korea, Taiwan	Tier II



China, Cyprus, Kuwait, Malaysia, Malta, México, Portugal, Poland, Qatar, UAE, Thailand	Tier III
Bahrain, Brazil, India, Indonesia, Jordan, Kazakhstan, Morocco, Panamá, Russia, Turkey	Tier IV
Argentina, Ghana, Honduras, Kenya, Lebanon, Libya, Nigeria, Pakistan, Ukraine, Venezuela	Tier V

**2) From Coface, Q3 2018 (<http://www.coface.com>):**

Coface is France's export credit underwriter, offering insurance against the risk that when you sell something to a foreign company, they won't pay their bills (for whatever reason, from bankruptcy to international war).

Country	Rating	Business Defaulting Risk
Austria, Germany, Luxembourg, Netherlands, Norway, Switzerland,	A1	Very Low
Australia, Belgium, HK, Japan, New Zealand, South Korea, Taiwan, USA	A2	Low
Canada, Chile, Hungary, Ireland, Lithuania, Malaysia, Poland, U.K.	A3	Satisfactory
Botswana, Bulgaria, Italy, Indonesia, Kenya, Perú, Thailand, Uruguay	A4	Reasonable
Brazil, China, Ghana, Kazakhstan, México, Russia, South Africa	B	Fairly High
Argentina, Lebanon, Ethiopia, Ghana, Serbia, Togo, Turkey, Uganda	C	High
Angola, Chad, Guyana, Haiti, Madagascar, Nepal, Nicaragua, Pakistan	D	Very High
Cuba, Iraq, Libya, Mozambique, Syria, Yemen, Venezuela, Zimbabwe	E	Extreme
















**Example:** Spread on government European bonds – Oct 31, 2018.

Base Rate: German government bonds

⇒ Higher observed spreads, higher CR.

Yields online between 9:00am to 5:30pm CET Monday to Friday

### European Bond Yields and Spreads

		2yr		5yr	10yr
Country		Yield	Spread*	Close†	Change‡
	Germany (0.25% 15 Aug 2028)	0.39	-	0.37	0.02
	France (0.75% 25 Nov 2028)	0.75	+37	0.75	0.01
	Belgium (0.8% 22 Jun 2028)	0.78	+39	0.78	0.00
	Italy (2.8% 1 Dec 2028)	3.43	+305	3.49	-0.05
	Spain (1.4% 30 Jul 2028)	1.55	+117	1.57	-0.02
	Denmark (0.5% 15 Nov 2027)	0.34	-5	0.32	0.02
	Finland (0.5% 15 Sep 2028)	0.65	+26	0.64	0.01
	Netherlands (0.75% 15 Jul 2028)	0.52	+14	0.51	0.02
	Austria (0.75% 20 Feb 2028)	0.60	+21	0.58	0.01
	Czech Republic (2.5% 25 Aug 2028)	2.16	+177	2.15	0.01
	Ireland (0.9% 15 May 2028)	0.96	+58	0.94	0.02
	Slovenia (1% 06 Mar 2028)	1.14	+76	1.14	0.00
	Hungary (3% 27 Oct 2027)	3.73	+335	3.64	0.09
	Portugal (2% 17 Oct 2028)	1.87	+149	1.88	-0.01
	Slovakia (1% 12 Jun 2028)	1.08	+69	0.99	0.09

\* Spread To Benchmark † Day Close Yield Value (at 16:00 CET) ‡ Daily Yield Change

Time snapshot: 31/10/2018 - 5:29 PM CET

From MTS Indices: <http://www.mtsindices.com/european-bond-spreads>. ¶

## CHAPTER 16 – BRIEF ASSESSMENT

1. Suppose the Brazilian government wants to borrow in USD for 7 years. You want to set the YTM in USD and in BRL. You have the following data:

Brazil's grade: BB (associated with a spread of 280 bps (2.80%) over US Treasuries).

7-yr US Treasuries yield = 2.5%.

$E[I_{US}] = 2\%$

$E[I_{BR}] = 6\%$

2. Suppose Colombia wants to borrow for 3-yers (medium-term) in USD. Given the information below determine the YTM for Colombian debt. (Use Table 16.1 and a linear interpolation method to set the spread).

Factor	Medium-term Horizon	
	Weight	Grade
Economic	.30	90
Debt management	.25	90
Political	.25	70
Structural	.20	60

3-year US Treasuries yield: 2.1%.

3. What is the effect on Colombia's YTM's of the following events?

- (A) Commodity prices, say coffee prices, decrease.
- (B) The Colombian government runs an unexpectedly large government deficit.
- (C) Colombian economy grows more than expected.
- (D) The US Fed increases interest rates.